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THE PRE-COLUMBIAN OCCURRENCE OF LAGENARIA SEEDS IN COASTAL PERU

BY
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IN the light of the recent discussion by Dr. Thomas W. Whitaker (Whitaker & Bird, 1949) of the seeds of gourds (*Lagenaria siceraria*) recovered at Huaca Prieta on the coast of Peru, the results of a study of gourd seeds found at four other archaeological sites on this coast are of special interest.

The site of Huaca Prieta is located on the north coast of Peru not far from the mouth of the Chicama River. It consists of a large midden and a smaller midden slightly to the north of the larger. Both of these were examined by Mr. Junius B. Bird in 1946–47 and described by him in his preliminary reports (Bird, 1948). The exploration of the site proved that the larger mound and the lower levels of the smaller mound represent an early primitive culture which Bird designates as "Early Farmers" or "Preceramic agriculture." The time limits of this horizon are approximately 3000–1200 B.C. according to radiocarbon dating (Bird, 1951). The economy of these people was based partly upon fishing, and partly upon agriculture. Although remains of maize were lacking, specimens of a number of other plants were recovered. Some of these, such as the cat-tail, were native to the area and grew wild, while others, like the cucurbits, in all probability were cultivated.

A later culture known as Cupisnique appeared in the upper levels of the smaller midden. An early type of pottery and small cobs of maize were among the cultural innovations found in these levels. This evidence suggests that a group of people had migrated into the area from another region.

One of the plants most frequently found in both the Preceramic and Cupisnique levels was the common gourd, *Lagenaria siceraria.* Its occurrence was more marked in the older period, the recovered specimens consisting of gourd artifacts, shell fragments, peduncles and seeds. These categories were also represented in the later period, but the specimens, though still abundant, were fewer in number. Selected samples of the cucurbit materials recovered by Bird were submitted to Whitaker for study. These samples consisted of specimens of both Lagenaria and Cucurbita and are described in his report.

From the specimens found in the lower or Preceramic levels, Whitaker isolated two types of Lagenaria seeds. One type was disassociated from the fruits; the other was still contained in a bottle gourd that had been used as a net float. The first group of seeds is characterized by large size, parallel longitudinal lines and the presence of a winged protuberance at either side of the broad end of the seed. The measurements of these large seeds are not given, but a fair approximation may be obtained by comparison with the mm. scale at the bottom of the photograph in which the seeds are pictured (Whitaker & Bird, 1949, fig. 3 D). The average maximum length of the six specimens shown is 17 mm.; the average maximum width 9 mm. Whitaker states that these large, broad seeds with their paired winged protuberances are similar to modern Lagenaria seeds from the Old World. Furthermore, he notes that they are in marked contrast to the typical gourd seeds found in other archaeological collec-

tions from South America which are said to be smaller in size, slender and often lacking the paired winged protuberances.

This smaller type was represented in the lower levels at Huaca Prieta by seeds recovered from a net float and illustrated by Whitaker (loc. cit., fig. 3 C). These seeds have an average maximum length of 13 mm.; an average maximum width of 6 mm.; in two cases they appear to have a suggestion of a winged protuberance. In addition to this group of specimens, others of the same type were recovered from the later or Cupisnique levels.

To summarize the occurrence of these two types of Lagenaria seeds at Huaca Prieta: the first or large, broad type appeared only in the Preceramic horizon; the second or small type was recovered in both the Preceramic and the Cupisnique levels.

Through the generosity of Dr. William Duncan Strong of Columbia University I have been privileged to study the ethnobotanical collections from several other archaeological sites on the coast of Peru. I wish also to express at this time my appreciation to various members of the Botanical Museum and the staff of the Biological Laboratories of Harvard University for their generous advice and assistance given me during the course of this study.

Among the plant remains in these Peruvian collections are seeds, peduncles and shells, both whole and broken, of *Lagenaria siceraria.* Descriptions of the seeds of this plant from four sites will be given below. However, it seems advisable at the outset to describe briefly the general structure of Lagenaria seeds.

The seeds of Lagenaria vary in shape and general appearance, depending upon the type of fruit; they are usually more or less tapering. The hilum, the point of attachment of the seed to the fruit, is at the narrower end. The seed coat or testa comprises three types of tis-

sue. The outer layer or epidermis consists of long, slender, parallel cells. These cells are easily damaged and only a few scattered broken cells of this layer may be found. The cells that constitute the second portion of the testa form a soft, spongy layer. The ones that comprise the inner part are more compact and furnish a hard, firm protective layer for the embryo.

Among the external characteristics that Lagenaria seeds may possess are longitudinal ridges, and paired winged protuberances at either side of the end of the seed opposite the hilum. These are surface outgrowths of the testa and are formed of the cell tissue of the outer layers of the seed coat. Because of the spongy nature of this tissue these structures may disappear in time through erosion, as may part of the outer layer itself, leaving merely a narrow strip of spongy tissue or possibly only the hard inner layer of the testa.

The archaeological sites from which the Lagenaria seeds were obtained are Aspero, Huaca de la Cruez, Pachacamac and Castillo de Tomaval. Two of these sites, Aspero and Pachacamac, are located on the central coast of Peru. The other two, Huaca de la Cruez and Castillo de Tomaval, are located in the Viru Valley on the north coast of Peru south of the site of Huaca Prieta.

The Aspero site is located near Puerto de Supe. It was excavated by Strong and Willey in 1941–42 (Strong, 1943). Among the plant remains recovered is a whole oblong gourd (747/41A), with the wall crushed at one point. This presumably occurred after it was placed in the burial in which it was found. The gourd contained 288 seeds some of which were still attached to the shell wall when examined. All of these seeds show evidence of erosion, although in varying degrees. Samples of groups of these seeds based upon the degree of erosion are shown in Plate LVII.

Of the 288 seeds, 117, or approximately 40 percent, are well preserved (Plate LVII, A). The outer surface of the specimens is only slightly eroded and the parallel longitudinal lines and paired winged protuberances are clearly seen. The average maximum length is 14 mm.; the average maximum width 8 mm. These seeds are a light brown color. There are 137 seeds, approximately 48 percent of the total, which show intermediate degrees of erosion (Plate LVII, B). All of the specimens in this group show a marked degree of erosion, in some cases the wings of the seeds having completely disappeared. However, the parallel lines and the ridge on the edge of the seed can still be detected. Finally, there is a third group of seeds which shows the greatest evidence of erosion with neither parallel lines nor wings remaining (Plate LVII, C). There are 34 seeds, or 12 percent of the total, in this group. The average maximum length of these specimens is 14 mm.; the average maximum width 7 mm. The similarity between the average maximum length of the best and most poorly preserved seeds can be explained by the fact that in both groups the characteristic points at the center of either end of the seed are part of the harder inner layer of the seed coat. They are thus more resistant to erosion than those parts of the testa that comprise the softer outer layer. In these two groups of specimens these points were used in the majority of cases in obtaining the maximum seed length, since the wings did not extend below the point at the center of the broad end of the seed.

The well preserved seeds of this gourd from Aspero resemble the large, broad, winged seeds from the Preceramic levels at Huaca Prieta described by Whitaker, although their average maximum measurements lie between the measurements of his two categories. The slender, eroded seeds from the same gourd might easily be

mistaken for seeds of the second or smaller type found at Huaca Prieta, as a comparison of Plate LVII, C with Whitaker's fig. 3C clearly reveals. Yet the variation in the seeds of the Aspero gourd, all contained in a single fruit, is strictly the product of differences in the degree of erosion.

The early Ancon-Supe period of the central coast, to which the Aspero site belongs, is contemporaneous with the Cupisnique period of the north coast. Although the large, winged gourd seeds were not recovered from the Cupisnique levels at Huaca Prieta, gourd plants producing seeds of this kind were existing at that time at Aspero to the south.

At Huaca de la Cruez in the Viru Valley Strong discovered 88 seeds (3/V-162) and some shell fragments of Lagenaria in a burial of the Mochica period. The seeds were together in one lot. Although not actually associated in the collection with the parent fruit, which in all probability became broken after burial, the shell fragments and seeds may have been parts of a single fruit.

All of these seeds from Huaca de la Cruez show evidence of erosion. Seventeen specimens, or 27 percent of the entire group, are fairly well preserved; 37 specimens, or 45 percent, show marked erosion; while 27 seeds, or 33 percent, have lost practically all of the outer layer of the seed coat. A series of these specimens showing progressive degrees of erosion are illustrated in Plate LVIII.

The seventeen best preserved specimens (Plate LVIII, A) have an average maximum length of 18 mm. and an average maximum width of 10–10.5 mm. The parallel longitudinal lines and the paired wings are distinct. The color of the seeds is generally a light brown. A few, however, have an occasional black marking due to discoloration from the grave content.

The 27 specimens showing the greatest degree of ero-

sion (Plate LVIII, C) have lost the parallel lines and the paired protuberances. A thin layer of the softer outer surface of the testa alone remains. These seeds have an average maximum length of 16 mm. and an average maximum width of 8 mm. Compared to the measurements of the best preserved group of seeds, they are 2 mm. shorter in the average maximum length and 1.5–2 mm. narrower in the average maximum width. The color of this group of seeds is either black or brown mottled with black. Attached to the surface of several seeds are fragments of carbonized material. These seeds, like those from Aspero, could, if found separately from the better preserved ones, be classified as belonging to the slender type of Lagenaria seed found at Huaca Prieta. However, when the entire series is considered, all the Lagenaria seeds found at Huaca de la Cruez, as at Aspero, must be referred to the large, broad type found in Preceramic levels at Huaca Prieta.

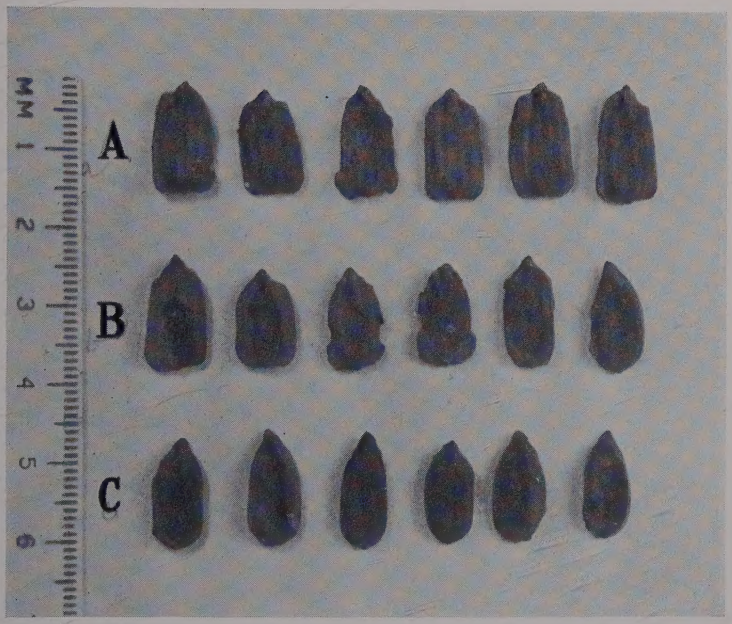
A second site on the central coast in which seeds of Lagenaria were recovered is Pachacamac. This large and important site lies in the Lurin Valley 30 kilometers from the present city of Lima. The extensive area covered by the ruins of the ancient city of Pachacamac includes the remains of the Temple of the Sun and the Temple of Pachacamac. This site has been the object of much exploration and study, one of the most recent of which has been the excavations of Strong, Willey and Corbet in 1942 (Strong, 1943). They concentrated the major portion of their work upon the large midden to the south of the main entrance to the Temple of the Sun. Two cuts were made from the outer edge of the debris to the temple wall, in an endeavor to study whatever cultural sequence existed.

Among the wide variety of plant remains recovered were numerous specimens of Lagenaria. There were two

EXPLANATION OF THE ILLUSTRATION

PLATE LVII. Seeds of Lagenaria from a single gourd recovered at Aspero showing varying degrees of erosion. A, best preserved. B, intermediate. C, most poorly preserved.

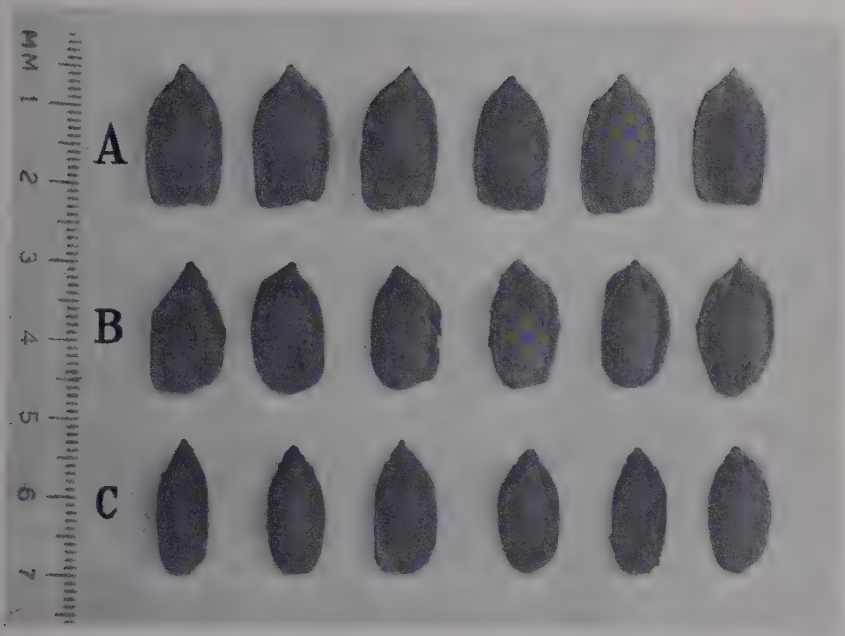
PLATE LVII



EXPLANATION OF THE ILLUSTRATION

PLATE LVIII. Seeds of Lagenaria from a burial at Huaca de la Cruez showing the effect of erosion. A, well preserved. B, showing marked weathering. C, strongly eroded.

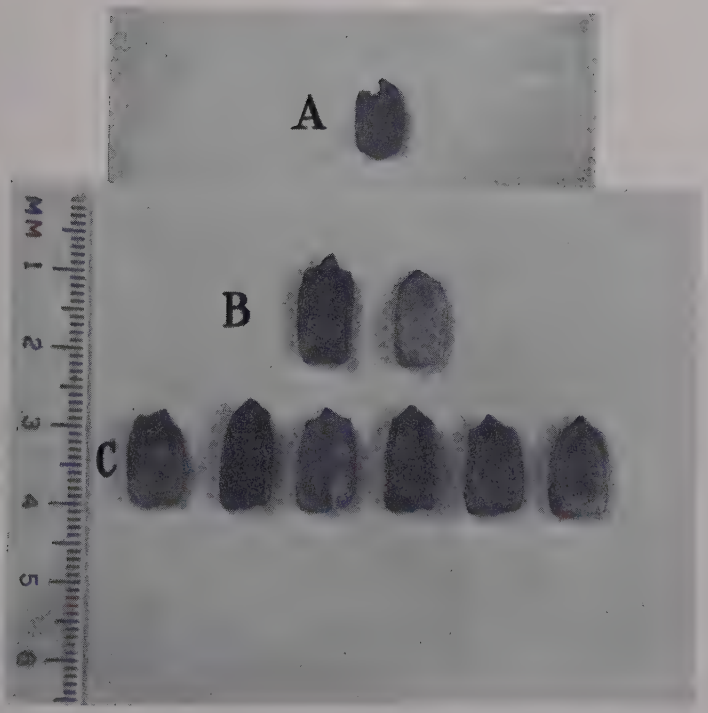
PLATE LVIII



EXPLANATION OF THE ILLUSTRATION

PLATE LIX. Lagenaria seeds recovered from Castillo de Tomaval and Pachacamac. A, eroded seed of *Lagenaria siceraria* recovered from Castillo de Tomaval. B, two seeds from specimen 135/41A from Pachacamac. C, group of seeds from specimen G 81 from Pachacamac.

PLATE LIX



shell fragments of this fruit to which seeds still clung along the inner shell wall. One specimen (135/41A) accompanied by two seeds (Plate LIX, B) comprises the flower end of a gourd fruit. The average maximum length of these seeds is 14 mm.; the average maximum width 7.5 mm. Both show some erosion of the outer seed coat, but the longitudinal lines and the paired wings are still distinct. One of the seeds is a cream color; the other a dark brown. This gourd shell was removed from a stratum showing Inca influence.

The stem end of another Lagenaria fruit (G 81) was recovered from the general digging in this refuse heap. Ten seeds were attached to the inner shell wall. These have an average maximum length of 14 mm.; and an average maximum width of 8 mm. All of these seeds retain the outer layer of the seed coat, although in a few specimens the parallel lines and paired wings have been partially worn away. Six of the seeds are a deep cream color while four are dark brown. A series of these seeds is shown in Plate LIX, C. It is not possible to give the exact cultural period to which this material belongs, since it came from the general digging. However, judging from the distribution of specimens of pottery found in this portion of the midden, it is reasonable to assume that it belonged to either an Inca-associated or Inca level.

The remaining site, Castillo de Tomaval, is in the Viru Valley on the north coast of Peru. Only one seed (21/V-51) of Lagenaria occurred in the collection of gourd remains from this site. This is a small, worn, partly-broken seed (Plate LIX, A) with a maximum length of 11 mm. and a maximum width of 7 mm. The outer layer of the seed coat is represented merely by a thin, uneven layer of spongy tissue with only a suggestion of the parallel longitudinal lines. The point at the center of the broad end of the seed is distinct, but only

a slight thickening of the outer layer of the testa suggests the former presence of wings. It seems reasonable to assign this eroded seed, as well as similar specimens from the other sites described, to the broad, winged type described by Whitaker. The site of Castillo de Tomaval is essentially of the Gallinazo period which follows the Cupisnique and the earlier Preceramic horizons.

In addition to the Lagenaria seeds described above, there are references in the ethnobotanical literature of prehistoric Peru to the occurrence of seeds of this plant in still other archaeological sites. Wittmack (1880–1887) identifies a gourd seed among the plant remains from Ancon on the central coast, and he gives an illustration (Taf. 107, fig. 17). Also, Costantin et Bois (1910, fig. 12) picture a seed recovered from another site on the central coast of Peru. Both of these seeds belong to the broad, winged type recovered at Huaca Prieta. Harms (1920) found fragments of gourd shells and seeds in the mummy wrappings from Ancon, but he neither illustrates nor describes this material. Carter (1945), in his study of certain archaeological cucurbit seeds from Peru, mentions the presence of 25 seeds of Lagenaria from Chincha on the south coast and attributes them to the late Inca period, c. 1300–1500 A.D. He gives their size as "17x7x3; 15x7x3" and further states that: "These are dark brown seeds with light longitudinal stripes and are of the characteristic Lagenaria size and shape." In the absence of illustrations or any mention of winged protuberances in the descriptions of the seeds recovered by Harms or those studied by Carter, one can not say definitely to which type of Lagenaria seed they belong, although on the basis of the few descriptive remarks that are given, one leans toward classifying both groups as of the broad, winged type of Lagenaria seed.

As a result of the present study of Lagenaria seeds in

collections of archaeological materials from Peru, it is evident that the seed type characterized by large size, the presence of longitudinal parallel lines and winged protuberances is the only type which occurs, and it is widely distributed in both time and space on the coast of Peru. Beginning on the north coast at Huaca Prieta it appears in Preceramic levels; at Castillo de Tomaval in the later Gallinazo period; and at Huaca de la Cruez in the much later Mochica period. Farther south on the central coast this seed type appears in the early Ancon-Supe levels at Aspero; and the later Inca-associated and Inca levels at Pachacamac. Although the cultural levels in which the seeds mentioned by Wittmack, Harms, and Costantin et Bois are not given, the age of the sites in which they were recovered makes it safe to attribute them to a late period. In other words, we have evidence that the large-seeded type of Lagenaria was in use in varying times from Preceramic through the Inca periods on the coast of Peru from Huaca Prieta on the north to Pachacamac and possibly Chincha on the south. Though one also suspects that some of the numerous gourd fruits recovered from sites further south produced this same broad type of seed, it is not possible to state definitely its presence there until descriptions and illustrations of material appear in the literature.

It is interesting to note that this large-seeded type of Lagenaria is unquestionably similar to seeds of gourds grown at the present time on the Peruvian coast. Through the kindness of Mr. Junius B. Bird, I have been able to examine modern Lagenaria seeds from the Chicama Valley. One sample of seeds, obtained from a round, bowl-shaped gourd, belongs to the large-winged seed-type. The other sample consists of smaller seeds with less pronounced wings. These came from a long-necked gourd that resembles the fruit from which Whit-

aker obtained his smaller type. The differences existing between these two groups of modern gourd seeds are probably due merely to a correlation with the type of fruit.

It has long been an accepted fact that Lagenaria was a well established cultigen in Pre-Columbian America, and the recent finding of gourd seeds in the Preceramic levels at Huaca Prieta has now placed its actual presence in the Western Hemisphere at or before 1200 B.C. (Bird, 1951). The problem of the origin of any cultivated plant is a matter of considerable interest, particularly in the case of a species which must have come from another hemisphere. Lagenaria is of special interest in that it was one of the few cultivated plants which was undoubtedly common to the tropics of both hemispheres in Pre-Columbian times.

Archaeological, historical, and linguistic evidence suggest that Lagenaria has long been part of man's economy in the Old World. He not only used the young fruits for food, but at an early date learned that the mature fruits were impervious to water and other liquids and therefore were admirably suited for containers. This characteristic also made this fruit adaptable for floats, particularly among people whose culture was intimately associated with the sea.

Many authorities consider *Lagenaria*, a monotypic genus, to be indigenous to Africa. But even if that is the case, it must have reached India and eastern Asia at a very early date, and then spread to Malaya, the islands of the Pacific, and tropical areas of the Americas. The question as to how this dispersal was effected is naturally a matter of speculation. Carter (1950), in his discussion of the presence of Lagenaria in the New World, concludes that this plant probably was carried by man across the Pacific ocean to the Western Hemisphere at an early

date. Kelly (1951) states even more emphatically that the evidence of Lagenaria in the New World points to early contacts between the two hemispheres. Although such a Pre-Columbian diffusion is a possible explanation, it is not the only one. Both authors refer, to but tend to minimize, the possibility of Lagenaria having floated to the shores of the Americas. It is, therefore, of interest to review some of the evidence for such a possibility.

The fruits of Lagenaria, like those of other genera of the Cucurbitaceae, are structurally adapted to dispersal by water. Although there is no experimental evidence to show how long a well-seasoned Lagenaria fruit will remain afloat, the buoyancy of these fruits and the impervious nature of their shell walls make it highly probable that they could float for an indefinite period.

There are many references in the literature to the transference of fruits and seeds from one location to another by means of ocean currents. One often quoted example is the presence on the coast of Norway of cucurbitaceous fruits and seeds from the American tropics carried there by the Gulf Stream. Included among these have been bottle-gourds (Ridley, 1930, p. 294).

Guppy (1906, p. 570) tells of having observed "small calabashes and bottle-gourds" on the beaches and in the ocean off the coast of Fiji. He experimented with one of these and proved that it was still buoyant even after it had floated in sea water for two months, and that some of the seeds germinated when planted in soil. He identifies this fruit as probably one of the species of *Cucurbita* that produces hard-shelled fruits. This genus is closely related to *Lagenaria.*

Guppy further reports (loc. cit., p. 125) the presence of a small bottle-gourd in the Guayaquil River and on the adjacent sea beaches in Ecuador. He states that these fruits will float for many months and that the seeds

will then germinate when planted. He concludes from the evidence that he presents that "bottle-gourds containing sound seeds are dispersed far and wide by the currents" and that "the gourds themselves will float for probably a year or more."

The coconut is another plant generally agreed to have been in both the New and Old World in Pre-Columbian times. The fruit of this palm, although its construction is quite different from that of the bottle-gourd, is also well adapted for water dispersal. Indeed its pericarp is essentially a floating organ. There is substantial evidence that the coconut has been widely dispersed by means of the sea (Ridley, 1930, p. 322).

From actual tests conducted by Edmondson (1941), it was proved that the seed of the coconut remained viable after having floated for 110 days in the ocean. This author further states that, given favorable conditions, a conservative estimate of the distance a coconut fruit might travel in that length of time would be 3,000 miles. In a private communication to Bruman (1941, p. 239) he says that he is convinced that a coconut would survive a much longer period than four months, but probably not one of seven months.

A more recent experiment with coconuts was carried on in connection with the voyage of the Kon-Tiki. Half of the coconuts taken were placed in baskets on the deck, while the remainder were stored beneath the raft where they were constantly washed by sea water. The result of this experiment was that the submerged fruits lost their viability; the others remained viable. However, the conditions under which the submerged lot of coconuts were placed do not completely simulate natural water dispersal. A coconut fruit in the sea floats buoyantly and is only partially submerged beneath the surface.

Certainly the evidence for water dispersal for Lagen-

aria, as well as for the coconut, is considerable and should not be dismissed too lightly in favor of the arguments for cultural diffusion.

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A NEW ARISTOLOCHIA FROM AMAZONIAN COLOMBIA

BY
RICHARD EVANS SCHULTES[1]

The caatingas of the upper Rio Negro area of Brazil, Colombia and Venezuela are fascinating to the naturalist because of the curious adaptation of their flora to xerophytism and because of the extraordinary number of endemics and primitive species which they harbor.

It was Spruce who, a century ago, first investigated these formations. Notwithstanding the thoroughness of Spruce's work and the collections of a number of later botanists, the composition and history of the caatinga-flora is but little understood. Every expedition into the upper Rio Negro basin brings back novelties and rare plants. Some of these indicate phytogeographical relationships with the flora of the great Venezuelan-Guianan land-mass; others, like the new concept which is described below, appear to stand alone with no close allies amongst the known species of South America.

Aristolochia Amesiana *R. E. Schultes sp. nov.*

Frutex scandens, robustissimus. Caulis volubilis, elongatus, paulo ramosus; rami volubiles, teretes, striolati,

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cum cortice nunc nigro nunc fusco-cinereo, tenui, glabro levique. Folia exstipulata, magnopere coriacea, elliptica, apice breviter apiculata vel subacuminata, basi rotundata (numquam cordata), margine valde revoluta, 13–16 cm. longa, 6–8 cm. lata, robustius petiolata (petiolis fusco-nigris, plerumque 2–3 cm. longis), nervis lateralibus quattuor, supra vivo cyaneo-viridia et nitidissima (siccitate straminea), cum nervis non elevatis, superficie oculo armato minutissime tessellata, subtus vivo pallide viridia, cum nervis omnibus prominenter elevatis, subdense sed minute albido-tomentulosa. Flores in racemis brevissimis, congestis, paucifloris et axillaribus, usque ad 8 cm. longi, pedunculo glabro gracili, usque ad 2 cm. longo. Perianthii pars basalis valde ovoideo-dilatata, 18 mm. longa, 10–11 mm. in diametro, extus glabra vel glabrescens et flavo-brunnea vel pallide purpurea; tubus obconicus, purpureo-venosus, stramineus vel flavo-brunneus, usque ad 3 cm. longus, basi 4 mm. sed apice 20 mm. in diametro, intus purpureo-papillosus, in os parvum constrictus; limbus altero latere expansus, altero truncatus, membranaceus, intus atrosanguineus, extus basi purpureus et prope apicem fusco-viridis, ovalis, 42 mm. longus, 20 mm. latus, ecaudatus, apice usque ad 2 mm. incisus, vivo subcucullatus, omnino glaber. Columna genitalis 5 mm. longa, apice 2.5 mm. in diametro, breviter stipitata, per dimidium sex-divisa, lobis pseudostylinis acutis. Stamina sex in serie unica, columnae adnata, antheris linearibus, usque ad 2.2 mm. longis, longitudinaliter dehiscentibus. Fructus adhuc ignotus.

A very robust vine. Stem twining, elongate, little branched. Branches twining, terete, striolate; bark either black or brownish grey, thin, glabrous, smooth. Leaves without stipules, extremely coriaceous, elliptic, apically short-apiculate or subacuminate, basally rounded (never cordate), the margin strongly revolute, 13–16 cm. long,

6–8 cm. wide, lateral veins four, in life glossy and bluish green above (straw-colored when dried), the surface very minutely tessellate under a glass, nerves not elevated, in life paler green beneath with all nerves prominently elevated, rather densely but minutely whitish tomentulose. Petiole robust, brownish black, mostly 2–3 cm. long. Racemes very short, congested, few-flowered, axillary. Flowers up to 8 cm. long with glabrous, slender peduncles up to 2 cm. long. Basal portion of perianth strongly ovoid-dilated, 18 mm. long, 10–11 mm. in diameter, glabrous or glabrescent, yellowish brown or pale purple without; tube obconic, purple-veined, straw-colored or yellow-brown, up to 3 cm. long, basally 4 mm. but apically 20 mm. in diameter, constricted into a small mouth, distantly papillose within; one lip expanded only on one side, truncate on the other, membranaceous, dark blood-red within, but outside, purple at the base and brownish green near the apex, oval, 42 mm. long, 20 mm. wide, ecaudate, apically with a slit up to 2 mm. deep, subcucullate in life, glabrous. Column 5 mm. long, apex 2.5 mm. in diameter, short-stipitate, divided into six parts for half its length; the pseudo-styline lobes acute. Stamens six in a single whorl, adnate to the column; the anthers linear, up to 2.2 mm. long, longitudinally dehiscent. Fruit unknown.

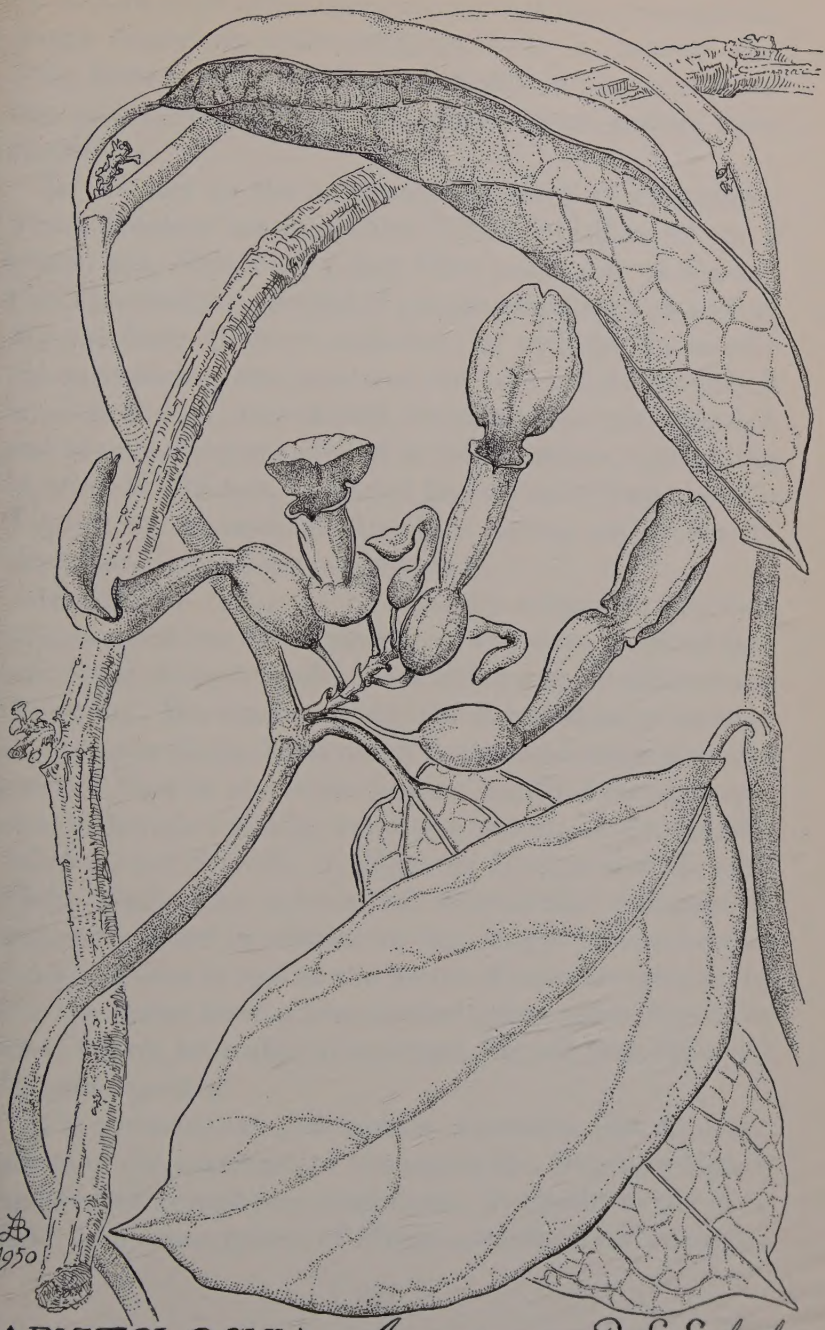
Colombia: Comisaría del Vaupés, Río Negro, San Felipe (El Castillo), below confluence of Ríos Guainía and Casiquiare. "Vine. Leaves thick. Flowers brownish red outside, tip greenish brown outside. In caatinga." December 12, 1947, *Richard Evans Schultes & Francisco López 9296*.

Aristolochia Amesiana does not appear to be closely related to any of the described species of this interesting genus. It is at once set off as distinct by the extremely thick-coriaceous texture of its leaves. In having leaves which are elliptic with a rounded (never even slightly

EXPLANATION OF THE ILLUSTRATION

PLATE LX. ARISTOLOCHIA AMESIANA *R. E. Schultes.*
Habit and flowers about three quarters natural size.
Drawn by BLANCHE AMES

PLATE LX



ARISTOLOCHIA *Amesiana R. E. Schult.*

cordate) base, *Aristolochia Amesiana* is also sharply distinct from most other species, approaching, amongst the South American representatives, only *A. maxima* Jacquin from which it differs markedly in the texture of the leaves, structure of the inflorescence and in floral characters.

In the key to the subgeneric sections of *Aristolochia* which Hoehne has published (Flora Brasilica 15, pt. 2 (1942) 25), *Schultes & López 9296* traces out to his section *Exstipulatae* (devoid of pseudo-stipules), sub-section *Euunilabiatae* (flowers unilabiate, or with the lip usually not surrounding the mouth of the tube but developed on one side alone). *Aristolochia Amesiana* does not approach any of the concepts included in these sections, resembling *A. disticha* Masters, a species known only from the Rio Tapajóz in Amazonian Brazil, in having an extremely abbreviated racemose inflorescence.

In addition to the extraordinarily coriaceous and basally rounded leaves, *Aristolochia Amesiana* exhibits several other characters which are either rare or unknown in the genus. The curious triangular indentation or incision at the apex of the lip is much deeper and more strongly marked than in any other known South American species, although a similar condition is seen in *Aristolochia Macbrideana* Standl., *A. Eggersii* Hoehne and *A. papillaris* Mast. The column of *Aristolochia Amesiana* is unusually short in relation to the length of the tube, a condition seen in few of the South American species. In life, the leaves have a blue or steel-green sheen which, so far as I have been able to ascertain, has not been reported for other species.

It is obvious that *Aristolochia Amesiana*, like all other plants of the caatingas of the upper Rio Negro, is highly adapted to xerophytic conditions. It climbs in the low, light, semi-open groves of *Hevea pauciflora* var. *coriacea*,

Didymopanax Spruceanum, *Retiniphyllum* spp., *Bombax humile* and bushy species of *Clusia*. Apparently it is a rare element of the caatingas, since only one flowering plant was located during a year's stay in the region, although at least five other vines in sterile condition were seen in the same caatinga at San Felipe where the type was found.

Of the 137 South American species of *Aristolochia* treated by Hoehne in his monograph (loc. cit.), thirty-nine are known from the Amazon basin, and a number of other species, which as yet have not been collected from this area, are suspected to occur there. *Aristolochia*, it is evident, is well represented in this part of the continent. It is curious that all of the botanical activity along the Rio Negro has turned up only four species—all of them endemic to the basin—in this area which is one of the richest in diversification of species of plants. A century ago Spruce collected the type of *Aristolochia Sprucei* Mast. at São Gabriel, and in the 1880's Barbosa Rodrígues collected *A. sylvatica* Barb. Rodr. at Manáos and *A. chrysochlora* Barb. Rodr. at Tarumá. These three species, like *Aristolochia Amesiana*, are apparently rare elements of the flora, for they are known only through the type collections. None is closely allied to *Aristolochia Amesiana* nor to each other.

It is an honor for me to dedicate this new endemic, albeit belatedly, to the late Professor Oakes Ames, in commemoration of his more than fifty years of service to Harvard University and his widespread influence as an outstanding orchidologist and economic botanist, a quietly inspiring teacher and a far-sighted administrator.